Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, June 9, 2023 @12:00 p.m.

presented by:

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"Purinergic signalling regulates the neuroregenerative responses of *Danio rerio* following spinal cord injury"

In mammals, permanent neuronal loss following spinal cord injury contributes to chronic deficits in sensory and motor function. A resident population of stem cells undergoes a weak proliferative response but fail to replace the lost neurons within the CNS. In contrast, naturally regenerative species, such as zebrafish (*Danio rerio)*, undergo injury-induced neurogenesis (birth of new neurons) within the adult spinal cord. Following injury in adult zebrafish, endogenous stem cells within the spinal cord undergo a much stronger proliferative response and neural differentiation. Newly generated neurons are re-integrated into the spinal circuitry within 6 weeks post-injury that leads to the functional recovery of swimming behaviour. The molecular mechanisms responsible for stimulating these adaptive processes are of great interest but have yet to be elucidated. One possible signalling mechanism regulating injury-induced responses is the purinergic signalling system. This signalling system, consisting of purines and pyrimidines (ie. ATP, UTP, etc) is evolutionarily conserved and a ubiquitously used for neuronal and glial transmission within the central nervous system. In particular, the purinergic receptor P2Y2 has been implicated in both stem cell proliferation and neural differentiation in mammals and previous work in our lab has found P2Y2 to be upregulated following spinal cord injury in zebrafish. Further elucidation of the role of P2Y2, among other purinergic receptors, in the adaptive regenerative response within adult zebrafish may offer new insights into the promotion of regeneration in mammalian systems and the development of novel therapeutic interventions.